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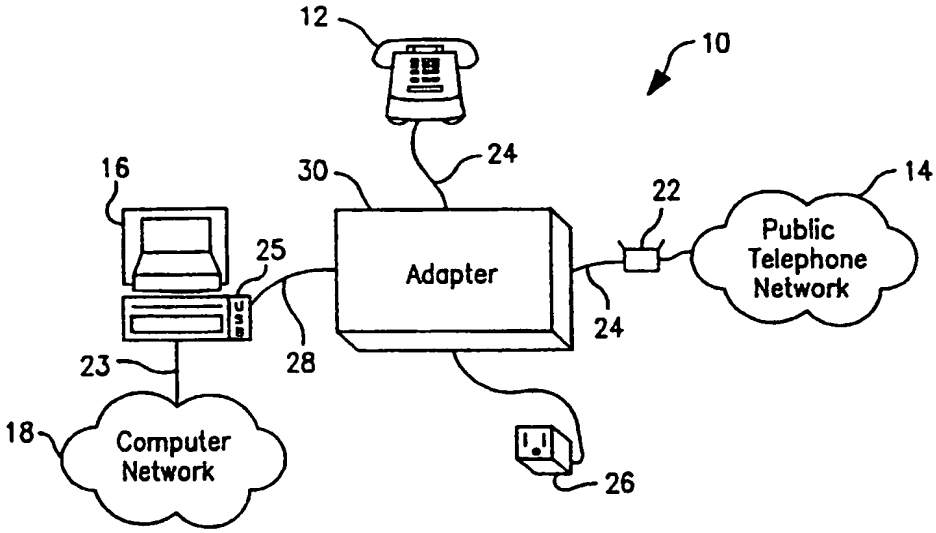
(54) Title: COMPUTER NETWORK TELEPHONY ADAPTER DEVICE

(57) Abstract

A telephony adapter device is connected to a public telephone network, a conventional telephone, and a computer, which allows the conventional telephone to be used for both traditional telephony and computer network telephony. The adapter includes a first connector for connecting adapter to the telephone, a second connector for connecting adapter to the public telephone network, and a third connector for connecting adapter to the computer. The adapter also includes signal processing circuitry electrically connected to the third connector, a switch electrically connected by separate switch contacts to the first and second connectors, and the signal processing circuitry, and a microcontroller connected between the signal processing circuitry and the third connector. The switch electrically connects the first connector to the second connector in a first position, and electrically connects the first connector to the signal processing circuitry in a second position. Operation of the adapter, including the positioning of the switch, is controlled by the microcontroller.



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COMPUTER NETWORK TELEPHONY ADAPTER DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a computer network telephony adapter that facilitates the use of a conventional telephone for both traditional telephony and computer network telephony. More particularly, the invention relates to an adapter device that can be simultaneously connected to the public telephone network, a conventional telephone, and a computer, which allows the conventional telephone to be used for both traditional telephony and computer network telephony. The invention also relates to a communication system that facilitates the use of a conventional telephone for both traditional and computer network telephony. The invention further relates to a method of controlling telephonic voice communications via the public telephone network and a computer network.

2. Description of Related Art

Computer network telephony allows voice communication over a computer network, such as the Internet or an Intranet. Computer network telephony is becoming increasingly important in the so-called "information age," in both the private sector and the business world. This is because of the ease with which the world-wide computer network (the Internet) can be accessed and used.

Most private sector users, and many businesses, access the Internet using a modem-equipped computer to dial up an Internet service provider (ISP) using a local telephone number. The ISP then establishes communication between the Internet and the computer. Because the ISP's telephone number

is usually a local call, world-wide communication via the Internet can be achieved at the cost of a local telephone call. Alternatively, many business and government agencies have dedicated Internet connections, thus not requiring Internet access via an ISP.

The development of the Internet, with its concomitantly low communication costs, has spawned its use for voice communications, conventionally known as "Voice over Internet Protocol" (VoIP). This technology is currently utilized in three distinct platforms: (1) the conventional computer-to-computer platform, (2) the telephone Gateway platform, and (3) the Intranet platform. The first two platforms allow a caller to talk to another party anywhere in the world for the price of a local call. The third platform allows businesses to use an Intranet for voice communication, primarily via central gateways and routers, between remotely located branch offices.

The conventional computer-to-computer platform requires coordination between the communicating parties. Each party must first access the Internet. During the Internet telephone call, the caller's voice is digitized by the computer's sound card and sent out over the Internet as compressed and packetized TCP/IP traffic. At the receiving end, this data is received and processed by software to extract and decompress the voice signal, and is then sent to the receiving computer's speaker(s). However, this platform will not work with a conventional telephone. It requires a computer that is equipped with a sound card, microphone, and one or more speakers.

Private companies have entered the Internet telephony market by developing the telephone Gateway platform. These companies utilize proprietary Gateways connected to the public telephone network and the Internet. To initiate an Internet telephone call, a user dials into a local Gateway via the public telephone network. The local Gateway will then contact a remote Gateway, via the Internet, within the local telephone region of the party being called. The remote Gateway then

dials the number of the person being called, allowing the two parties to communicate over the Internet. Because both calls are local, the entire call takes place without long-distance charges. However, most Gateway solutions are proprietary and will not work with other vendor Gateways, and are not a practical solution because of expense and complication.

The Intranet platform allows businesses with remotely located branch offices to communicate using VoIP technology. This is accomplished much like the computer-to-computer platform, except the business's Intranet is used instead of the Internet. This platform, too, will not work with a conventional telephone and requires computers that are equipped with a sound card, microphone, and one or more speakers. However, the sound card, speakers, and microphone setup has lesser sound quality than a conventional telephone because, among other reasons, unlike a conventional telephone it lacks echo cancellation. Where speakers are used, it also lacks the privacy afforded by a conventional telephone.

Because of the low cost, it is reasonably foreseeable that the telephony infrastructure of the future will be based on VoIP. Thus, there is a need to bridge the gap between the existing public telephone network and the future infrastructure. The major problem with existing platforms is that they will not work with a conventional telephone, or they require use of a proprietary Gateway server. There are telephones and interface devices that connect to a computer or to a Local Area Network (LAN); however, these devices do not permit continued use of the public telephone network.

Another device, disclosed in U.S. Patent No. 5,838,665, links the public telephone network and the Internet via an adaptor telephone device. This device, however, requires the user to replace his or her existing telephone with the adapter device. Additionally, this device connects to the computer's sound card, thus monopolizing its functionality and preventing its use for other applications when utilizing this device.

Thus, there is a need for a device that allows users to take advantage of the current Internet and Intranet telephony infrastructure, without sacrificing the service level, stability, and connectivity of the current public telephony infrastructure, or having to replace their existing telephone with a specially designed device. There is also a need for a device that bridges these two infrastructures without requiring a separate, proprietary Gateway solution.

SUMMARY OF THE PRESENT INVENTION

It is therefore a principal object of the present invention to provide a telephone adapter that is simultaneously connected to a public telephone network, a conventional telephone, and a computer to allow computer network telephone calls to be conducted using the conventional telephone.

Another object of the present invention is to provide an adapter that is connected simultaneously to a public telephone network, a conventional telephone, and a computer to allow computer network telephone calls to be conducted using the conventional telephone, without sacrificing the sound quality and privacy afforded by a conventional telephone.

Yet another object of the present invention is to provide an adapter that is connected simultaneously to a public telephone communication line, a conventional telephone, and a computer to allow computer network telephone calls to be conducted using the conventional telephone, such that the adapter is controlled and powered by the computer.

In one aspect of the present invention, a telephone adapter includes first, second, and third receiving means. The first receiving means receives analog telephony signals from a public telephone network. The second receiving means receives analog telephony signals from a telephone. The third receiving means receives control signals and electrical power from the computer. A first activatable and deactivatable path

means transmits analog telephony signals between the first and second receiving means. A second activatable and deactivatable path means converts analog telephony signals received from the second receiving means to digitized signals and transmits the digitized signals to the computer. The second path means also converts digitized signals received from the computer to analog telephony signals and transmits the analog telephony signals to the second receiving means. Controller means, responsive to the control signals, deactivates the first path means and activates the second path means while the first path means is deactivated.

In a further aspect of the present invention a communication system includes a telephone, a computer connected to a computer network, and an adapter device connected to the telephone, a public telephone network, and the computer. The adapter device includes first, second, and third receiving means. The first receiving means receives analog telephony signals from a public telephone network. The second receiving means receives analog telephony signals from a telephone. The third receiving means receives control signals and electrical power from the computer. A first activatable and deactivatable path means transmits analog telephony signals between the first and second receiving means. A second activatable and deactivatable path means converts analog telephony signals received from the second receiving means to digitized signals and transmits the digitized signals to the computer. The second path means also converts digitized signals received from the computer to analog telephony signals and transmits the analog telephony signals to the second receiving means. Controller means, responsive to the control signals, deactivates the first path means and activates the second path means while the first path means is deactivated.

In yet a further aspect of the present invention a method of controlling telephonic voice communications includes connecting an adapter device between a public telephone network and a telephone, and connecting the adapter to a computer. The computer transmits electrical power and control

signals to the adapter for establishing at least first and second operating modes. In the first operating mode, analog telephony signals are transmitted between the telephone and the public telephone network via the adapter device. In the second operating mode, analog telephony signals are converted to digitized signals in the adapter and transmitted to the computer, and digital signals received from the computer are converted to analog telephony signals in the adapter and transmitted to the telephone.

In still a further aspect of the present invention, an adapter device for interconnecting a telephone with a public telephone network and a computer network includes a first connector, a second connector, a third connector, signal processing circuitry electrically connected to the third connector, and a switch electrically connected by separate switch contacts to the first and second connectors, and the signal processing circuitry. The switch electrically connects the first connector to the second connector in a first position, and electrically connects the second connector to the signal processing circuitry in a second position.

These and other objects, aspects, advantages and features of the present invention will become more apparent to those skilled in the art when the following detailed description is read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following detailed description, reference will be made to the attached drawings in which:

Figure 1 illustrates the overall telephony communication system and the integration of the computer network telephony adapter with the system, in a first embodiment of the present invention.

Figure 2 is a schematic diagram of the internal circuitry of the computer network telephony adapter of the present

invention.

Figure 3 illustrates the an overview of the overall system software interaction between the adapter and computer, according to the present invention.

Figure 4 is a flowchart illustrating the operation of the present invention for a public network telephone call.

Figure 5 is a flowchart illustrating the operation of the present invention for an incoming computer network telephone call.

Figure 6 is a flowchart illustrating the operation of the present invention for an outgoing computer network telephone call

Figure 7 illustrates the overall telephony communication system and the integration of the computer network telephony adapter with the system, in a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 depicts the overall telephony communication system 10 and the integration of adapter 30 into the system 10. The overall system includes the public telephone network 14, a host computer 16 connectable to a computer network 18, and a conventional telephone 12. Computer 16 includes a microprocessor (not shown) and memory (not shown) which stores software. Adapter 30 is integrated into the system 10 by connecting it to the public telephone network 14, the computer 16, and the conventional telephone 12.

Adapter 30 is connected to the public telephone network 14 via a conventional telephone wall jack 22. This can be accomplished by connecting conventional telephone wiring 24 between the wall jack 22 and adapter 30, which is also

equipped with telephone connectors and which will be discussed further. Conventional telephone wiring 24 also interconnects the telephone 12 and adapter 30.

Adapter 30 and computer 16 are preferably interconnected via one of the computer's universal serial bus (USB) ports 25. This can be accomplished by inserting a cable 28 between adapter 30 and the computer's USB port 25. One or more USB ports is standard in new computer systems, and can be added to an existing system quite readily by an ordinarily skilled artisan. The USB port 25 not only allows data communication between adapter 30 and computer 16, but also provides power to most of the adapter's internal circuitry. If, however, a user desires adapter 30 to generate a unique ring signal for an incoming computer network telephone call, an optional, detachable power connection 26 can be provided. This is because more power is required to generate a signal to ring telephone 12 than a standard USB 25 can provide. Thus, if this functionality is desired, adapter 30 is connected to a conventional electrical power wall plug using the optional, detachable power connector 26.

Computer 16 is connected to computer network 18, via connection 23, using any method known to the ordinarily skilled artisan. For example, connection 23 could be a digital network communication cable, such as Category-5 cable, or a wireless connection, such as an antenna. Alternatively, connection 23 could be a dedicated digital communication line whereby computer 16 is connected directly to the Internet. Or, connection 23 could be standard telephone communication wire connected between a modem (not shown) that is connected to computer 16, and computer network 18. These examples are, of course, not limiting and any connection known to an ordinarily skilled artisan could be used to interconnect computer 16 and computer network 18.

In a first embodiment, computer 16 is connected, via a dedicated connection 23, to computer network 18. Computer network 18 may be either an Intranet or the Internet, or both,

depending upon the configuration of computer 16 and its external peripherals. For example, the computer 16 could be connected simultaneously to an Intranet and the Internet using common communication wiring connected to a common server, as is known in the art. Alternatively, computer 16 could be connected to an Intranet and the Internet using separate connections for each. Again, these examples are not limiting and any configuration known to the skilled artisan could be utilized.

A detailed description of overall system 10 operation will be further discussed below. However, referring now to Figure 2, a detailed description of adapter 30 will be provided.

Adapter 30 is connected to public telephone network 14 via connector 34, to telephone 12 via connector 36, and to computer 16 via connector 72. Connector 82 allows optional power connector 26 (discussed above) to be attached to adapter 30. These connectors will be discussed in further detail below.

Adapter 30 includes circuitry 32 that provides the interface to the telephone 12, the public telephone network 14, and the adapter's internal circuitry. This circuitry 32 includes connectors 34, 36, circuit connections 38, 42, and a switching device 44. The connectors 34, 36 may be any device known to a skilled artisan for receiving analog telephony signals, but in the preferred embodiment are standard RJ11 telephone jacks. The switching device 44 may be any type known to the ordinarily skilled artisan. Examples include, but are not limited to, an analog switch, or a software switch. In the preferred embodiment, however, switching device 44 is a double-pole, double-throw (DPDT) relay.

The normal, non-energized position of switching device 44 is shown in Figure 2. This position interconnects connectors 34, 36 for public telephone network telephony communication. Thus, if electrical power is not available to adapter 30, conventional telephony functions can still be performed.

Connected to circuit connection 42, via another switching device 46, is a call hold terminator 48. Call hold terminator 48 allows an incoming public telephone network call to be placed on hold. This is accomplished by moving switching device 46 to interconnect the call hold terminator 48 and circuit connection 42. As with switching device 44, switching device 46 may be any type known to the ordinarily skilled artisan, but in the preferred embodiment is a double-pole, single-throw (DPST) relay. Additionally, call hold terminator 48 may be any loading device known to an ordinarily skilled artisan, but in the preferred embodiment is a resistor.

Also connected to circuit connection 42 is ring detector circuit 52. Ring detector circuit 52 senses an incoming ringing signal received from the public telephone network 14 and sends a notification signal to microcontroller 54 (e.g., a CPU or other software driven processor). Microcontroller 54 can then notify computer 16, via connector 72, that the public telephone network line is ringing telephone 12. Thus, if a computer network call is taking place when an incoming call is received from the public telephone network 14, computer 16 can notify the user with a distinct tone.

Connected to circuit connection 38 is off-hook detector circuit 56. This circuit senses when telephone 12 receiver is placed into either a calling mode or a call receiving mode by, for example, taking the receiver of a conventional cradle-held telephone off the hook, or pressing the "talk" button of a cordless telephone, etc. This circuit also sends a notification signal to computer 16 via microcontroller 54. This allows computer 16 to send a notification signal to the user's telephone receiver when a network telephone caller is attempting to call the user over the computer network 18, and the telephone is not hung up. This function will be discussed in more detail when the overall operation is described.

A dual tone multi-frequency (DTMF) detector circuit 58 can also be connected to circuit connection 38. This circuit may be incorporated into a single integrated circuit package with

off-hook detector circuit 56, or may be realized separately using an individual circuit. DTMF tone detector circuit 58 detects incoming DTMF tones from the public telephone network 14, which can be used to detect the telephone number of the incoming caller. DTMF tone detector circuit 58 can also detect the DTMF tones generated by telephone 12 when a user is placing an outgoing call. The purpose of this latter function will also be described in more detail below.

When the position of switching device 44 is set to allow computer network telephony communication, circuit connection 38 is electrically disconnected from circuit connection 42 and is electrically connected to interface circuit 62. This circuit provides proper signal gains for transmitting and receiving the telephony signals between computer 16 and telephone 12. This circuit also provides proper impedance matching between telephone 12 and the adapter's internal circuitry, and provides 2-wire/4-wire conversion for the signals passed to, and received from, the telephone 12. This circuit can be any known integrated circuit package known to the ordinarily skilled artisan, or can be realized using discrete components. However, in the preferred embodiment line interface circuit 62 is realized using a known interface circuit having manufacturer's part number Ericsson PBL38710_1.

Connected to interface circuit 62 is audio processor 64. Audio processor 64 converts the analog telephony signals received from telephone 12 via interface circuit 62, into serial signals. The serial signals are then transmitted to microcontroller 54. Audio processor 64 also receives serial digital signals from microcontroller 54 and converts the digital signals to analog telephony signals, which are then transmitted, via interface circuit 62, to telephone 12. Audio processor 64 may be controlled by microcontroller 54 to set various audio processing parameters. Examples include, but are not limited to, the audio processor 64 signal gain, and side-tone (echo) gain back to telephone 12. Audio processor 64 may also include a tone generator to produce DTMF and call progress tones which may be transmitted to telephone 12. This

circuit can be any known integrated circuit package known to the ordinarily skilled artisan, or can be realized using discrete components. However, in the preferred embodiment audio processor 64 is realized using known components, comprising at least manufacturer's part numbers AMD AM79C203.

Microcontroller 54 controls the overall operation of adapter device 30 using resident, on-board software stored in memory 66, while functioning as a slave to computer 16. In other words, software resident on computer 16 controls the operation of microcontroller 54, which in turn controls the operation of adapter 30 using its own software. All telephone 12 status information is transmitted from microcontroller 54 to computer 16, and microcontroller 54 is controlled based upon commands received from computer 16, via connector 72. Microcontroller 54 includes internal memory 78, such as random-access-memory (RAM), which can be used to store volatile information, for example the user-specified ring cadence (discussed further below). Microcontroller 54 includes parallel input-output (I/O) ports that may be used to control switching devices 44 and 46, and ring generator 68 (discussed below), and to monitor the status of ring detector circuit 52, off-hook detector circuit 56, and DTMF tone detector circuit 58. Microcontroller 54 also includes a bidirectional serial port for transmitting and receiving digital data to and from audio processor 64. Microcontroller 54 may be any software-driven processor device known to an ordinarily skilled artisan, but in a preferred embodiment is an Infineon C161U P-TQFP-100 generation controller.

Ring generator 68, connected between microcontroller 54 and interface circuit 62, can provide an output signal for ringing telephone 12, if, as noted previously, optional power connector 26 is used. Ring generator 68 is controlled by microcontroller 54 and can generate a signal which causes telephone 12 to ring with a unique, user-specified cadence when a network telephone call is received by the computer 16. This signal can be, for example, a 20 Hz sine wave or square wave output signal. The unique cadence can be set using

software resident on computer 16, which is then stored in RAM 78 of microcontroller 54. If, however, optional power connector 26 is not used, an external AC power plug is not available, or the user simply does not desire to ring telephone 12 when a network telephone call is received by computer 16, then computer 16 can be configured to alert the operator of an incoming network call. For example, the computer's sound card could be used to generate a signal of any desired fashion.

In alternative embodiments, special function circuits and components discussed above (for example, one or more of ring detector circuit 52, off-hook detector circuit 56, DTMF detector circuit 58, and ring generator 68) may be replaced with a digital signal processor (not shown) that performs their functions.

Adapter 30 is physically connected to computer 16 using USB connector 72. While this connector may be any device known in the art for interconnecting a processor and a USB port 25, in a preferred embodiment this connector is a USB "Series B" receptacle. As noted above, connector 72 can be connected to a USB port 25 of computer 16 using a standard, detachable cable 28 known to those of ordinary skill in the art. Alternatively, cable 28 can be an integral part of adapter 30. This integral cable would include a plug for connecting to a USB port 25 of computer 16.

Connector 72 is electrically connected to microcontroller 54 via an interface controller 74. Interface controller 74 functions to match the electrical characteristics of adapter 30 with those of computer 16. Interface controller 74 also interprets the serial data sequences received from computer 16 as either control signals or processed computer network telephony signals. Interface controller 74 may be a separate, individual circuit component known to those of ordinary skill in the art, but in a preferred embodiment is integrated into the circuit package of microcontroller 54.

The computer's USB port 25 is a 4-wire, polled, serial bus that provides data transfer over two of the wires, and DC electrical power over the other two wires. Therefore, as previously noted, electrical power for adapter 30 can be provided solely from the USB port 25 of computer 16, via USB connector 72. This can be accomplished by transmitting the DC power received from computer 16 to DC/DC converter circuitry 76. DC/DC converter circuitry 76 receives the DC power from the computer and converts it to the appropriate operating voltage levels for the internal circuitry of adapter 30, and for telephone 12 when disconnected from the public telephone network 14. For clarity, the DC power connections are not depicted in the Figures. However, the ordinarily skilled artisan would readily understand that these connections exist.

As noted above, overall system operation is controlled by software resident on computer 16. (However, in alternative embodiments, the system operation may be controlled, in whole or part, by a microprocessor located in the adapter (not shown).) An overview of the software implementation is shown in Figure 3. The software includes the microcontroller software 84, the main program 86, configuration software 88, and a network telephone client program 92. The microcontroller software 84 configures adapter 30 to allow both public telephone network telephony and computer network telephony, and is downloaded to adapter 30 each time computer 16 is powered up. This software 84 allows microcontroller 54 to perform basic detection and signal transmission functions, which have been discussed and which will be further discussed in more detail below. If computer 16 is powered down, adapter 30 allows only public telephone network telephony. The software on computer 16 also includes the main program 86. Main program 86 controls the overall system operation and will be discussed further below. Computer 16 further includes software component 88, which is a configuration program for gathering and implementing user-specified options. These options include, but are not limited to, the network telephone call ring cadence (discussed above), how a caller's telephone number will be displayed (discussed below), and the default

configuration for outgoing network telephone calls (discussed below). Computer 16 also includes in memory a network telephone client program 92. Program 92 converts the digitized telephony signals received from adapter 30 to compressed and packetized TCP/IP data for transmission over computer network 18. Program 92 also extracts and decompresses the network telephony signals received from network 18 as TCP/IP data. Program 92 can be any network telephony software known to the ordinarily skilled artisan. For example, this software could be Microsoft Netmeeting or software available from Net2Phone. The software on computer 16 can be implemented using any operating system known to an ordinarily skilled artisan, but in the preferred embodiment the operating system is a graphical user interface.

Having described in detail the overall system 10, the internal circuitry of adapter 30, and an overview of the software, a detailed operational description of the system 10 and adapter 30 will now be provided. The following description covers the three general operational configurations of the system when computer 16 is powered up and controlling system operation, these configurations cover: (1) an incoming public telephone network call; (2) an incoming computer network telephone call; and (3) an outgoing call over either network. Reference should be made to Figures 1, 2 and 4-6, as necessary. In the following discussions, the steps indicated in parentheses correspond with applicable flowchart steps in Figures 4 through 6.

1. Incoming Public Telephone Network Call

When a user receives an incoming call (STEP 101) from the public telephone network 14 while telephone 12 is not being used, the telephone 12 is connected directly to the public telephone network 14 as though adapter 30 were not present. Ring detector 52 senses the incoming ringing signal (STEP 102), and DTMF detector circuit 58 determines the telephone number of the calling party. The telephone number can then be sent to computer 16, via microcontroller 54, and displayed on

the user's computer 16 (STEP 103). Adapter 30 and computer 16 then sense if telephone 12 is already being used for a network call (STEP 104). If so, and the system is so configured, adapter 30 will then alert computer 16 to issue a distinctive tone to telephone 12. Specifically, if a network telephone call is taking place when the user receives a public telephone network call, the computer commands microcontroller 54 to momentarily change the position of switching devices 44 and 46, and cause audio processor 64 to generate a distinct tone, and then change switches 44, 46 back to their original positions (STEPs 105-107).

The distinct tone generated by audio processor 64 will be heard by the user, alerting the user of an incoming network call. The user can then switch between the public telephone network 14 and computer network 18 callers in one of two ways. First, the user could use hook flashes at telephone 12, which would be sensed by off-hook detector circuit 56. This would cause microcontroller 54 to change the position of switching device 46 to connect/disconnect connection circuitry 42 to/from call hold terminator 48 with each subsequent hook flash (STEPs 108-118). Second, the user could use commands directly from computer 16 to perform this same function. For example, a software-driven graphical user interface (GUI) could be utilized whereby a user could double-click on an icon using a mouse, as is well-known in the art. Although the GUI software embodiment is not illustrated, its functionality can be easily realized by an ordinarily skilled artisan.

When the call is complete, the user simply hangs up telephone 12 in the normal manner. Off-hook detector circuit 56 senses when the phone is hung up and sends a signal to microcontroller 54, which sends a signal to computer 16. Both microcontroller 54 and computer 16 are then reset to their pre-call configurations.

2. Incoming Computer Network Call

If an incoming computer network call is received (STEP 201),

the network caller's number is identified and displayed on computer 16 (STEP 202). Off-hook detection circuit 56 then determines whether or not telephone 12 is hung up (STEP 203). If telephone 12 is hung up, computer 16 alerts the user in one of two ways (STEP 204). If the user is utilizing optional power connection 82, then computer 16 will command microcontroller 54 to cause ring generator 68 to generate a unique, user-specified ring signal and transmit this to telephone 12, via interface circuit 62 (STEP 205). However, if optional power connection 82 is not used, or if the user simply desires not to use this function and has configured adapter 30 in this manner, then computer 16 will generate the unique, user-specified signal and send the signal to the computer's sound generation peripherals, such as a sound card and speakers (STEP 206).

If off-hook detection circuit 56 determines that telephone 12 is not hung up, computer 16 will alert the network caller in one of two ways (STEP 207). If computer 16 is so configured, it will send a unique tone to telephone 12 to alert the user of the incoming network call (STEP 208). The user can then use hook flashes (or the GUI discussed above) to transfer between the public network call and the computer network call (STEPs 210-218). When a hook flash (or GUI operation) is used to establish communication with the network caller, computer 16 will command adapter 30 to be reconfigured from its normal position. Specifically, computer 16 will command microcontroller 54 to change the position of switching device 44, thus connecting connection circuitry 38 to interface circuit 62. Simultaneously, computer 16 will command microcontroller 54 to configure audio processor 64 to begin converting and transferring the telephony signals between telephone 12 and computer 16 (STEP 212). A subsequent hook flash will, of course, reconnect the public network caller to telephone 12. If computer 16 is not configured to alert the user, then computer 16 will send a busy signal to the network caller (STEP 209).

While the user is being alerted to the computer network call

(STEPs 205 or 206), adapter 30 is also monitoring the status of telephone 12 using off-hook detector circuit 56 to determine when the call is answered (STEP 219). When off-hook detector circuit 56 senses that the call is answered, computer 16 either commands ring generator 68 to stop generating ring signals or computer 16 stops generating alert signals, depending upon the configuration, as discussed above (STEP 220). If, however, the network call is not answered within a predetermined period of time (e.g., 30 seconds) the program exits (STEP 221). Once the call is answered, computer 16 commands microcontroller 54 to reconfigure adapter 30, as discussed above (STEP 212).

During the network telephone call, adapter 30 continues to monitor public telephone network 14 for incoming calls (STEPs 221-224). Ring detector circuit 52 monitors connection circuit 42 for a ring signal from the public telephone network 14 (STEP 222). If a ring signal is detected, ring detector circuit 52 signals microcontroller 54 which in turn notifies computer 16. If so configured, computer 16 then notifies the user by generating a unique tone to telephone 12 (STEPs 223 & 224), similar to when a computer network call is received while conducting a public telephone network call, as discussed above. The user can then switch between the calls using hook flashes or the GUI (STEPs 213-218), also as discussed above.

When the network call is completed, the user simply hangs up telephone 12. Off-hook detector circuit 56 senses when the phone is hung up and sends a signal to microcontroller 54, which sends a signal to computer 16. Both microcontroller 54 and computer 16 are then reset to their pre-call configurations.

3. Outgoing Public Telephone Network or Computer Network Call

The operation for placing an outgoing call varies depending upon how the user has configured the system 10. Computer 16 and adapter 30 can be configured, using the software resident

on each, to operate in one of two modes: (1) computer-based mode; or (2) simulated public branch exchange (PBX) mode. Both configurations are generically illustrated in Figure 6 as STEP 301. A detailed description of each configuration is provided below.

When configured to operate in computer-based mode, the user first configures computer 16 and adapter 30 for the type of call being placed using software resident on computer 16. The user then initiates the call by picking up the telephone 12 receiver and dialing the appropriate telephone number. Thus, when the user desires to make a public telephone network call, adapter 30 need not be reconfigured from its normal operating mode, which allows all telephony signals to pass directly between telephone 12 and public telephone network 14. To place a computer network call in this mode, the user reconfigures adapter 30 using computer 16, such that all telephony signals are passed between telephone 12 and computer 16. This is accomplished by computer 16 ordering microcontroller 54 to change the position of switch 44 to interconnect connection circuitry 38 and line interface circuit 62. The user then dials the appropriate number of the party being called, for example the Internet protocol (IP) address, using software on computer 16. Alternatively, the user could dial the number using telephone 12. In this case, DTMF detector circuit 58 detects the digits being dialed and sends this information to computer 16, via microcontroller 54 and connector 72. Using either method, the client software 92 on computer 16 detects an outgoing network call attempt (STEP 301).

When the system is configured to operate in the simulated PBX mode, adapter 30 automatically defaults to connect telephone 12 to public telephone network 14. However, DTMF tone detector circuit 58 detects the digits the user dials on telephone 12, and forwards this information, via microcontroller 54, to computer 16. Based upon the initial digits dialed, computer 16 determines whether a computer network call is being placed. If client software 92 detects

the outgoing network call attempt, computer 16 then automatically configures adapter 30 for this purpose. If, however, a public telephone network call is being placed, then adapter 30 is not reconfigured.

Subsequent operations carried out by adapter 30 and computer 16 for both a public network telephone call and a computer network telephone call are the same for both the computer-based mode and simulated PBX mode. These subsequent operations will now be discussed.

When the client software 92 detects the outgoing call attempt (STEP 301), it is first determined whether a network call is already taking place (STEP 302). If so, then a message is displayed on computer 16 alerting the user to this fact (STEP 303). If a network call is not taking place, a determination is made as to whether a public network call is taking place (STEP 304). If so, a message informing the user is displayed on computer 16 (STEP 305). The user can then use hook flashes or GUI to place the public network call on hold (STEPs 306 and 307). If the public call is not placed on hold in a predetermined period of time (e.g., 30 seconds), then the attempted computer network call is canceled (STEP 308).

If neither a computer network call nor a public network call are taking place, or after the public network call has been placed on hold (STEP 307), the data path between adapter 30 and computer 16 is opened and the number of the party being called is then sent out over computer network 18, to the appropriate IP address. Audio processor 64 can then transmit the call progress signals, discussed previously, to telephone 12. When the party being called answers, audio processor 64 is configured to transmit, receive, and convert the telephony signals, as appropriate, between computer network 18 and telephone 12. Additionally, if the user is making a computer network call, the user has the option of configuring computer 16 and adapter 30 to use the computer's installed sound peripheries, such as a sound card, microphone, and speakers, instead of using telephone 12. (All of the foregoing

functions are accomplished in STEP 309.)

During the network telephone call, adapter 30 continues to monitor public telephone network 14 for incoming calls (STEPs 310-314). Ring detector circuit 52 monitors connection circuit 42 for a ring signal from the public telephone network 14 (STEP 312). If a ring signal is detected, ring detector circuit 52 signals microcontroller 54 which in turn notifies computer 16. Computer 16 then notifies the user by generating a unique tone to telephone 12, similar to when a computer network call is received while conducting a public telephone network call, as discussed above (STEP 313). The user can then switch between the calls using hook flashes or GUI, also as discussed above (STEPS 315-319).

For both operational modes, when the call is complete the user hangs up telephone 12. Off-hook detector circuit 56 senses this condition and sends a signal to microcontroller 54, which sends a signal to computer 16. Microcontroller 54 and computer 16 are then reset to their pre-call configurations.

Figure 6 depicts a second embodiment of a system 10 incorporating adapter 30. In the second embodiment, computer 16 is connectable to a computer network 18 using the public telephone network 14, via a modem (not shown). This configuration is encountered where the user does not have a separate connection 23 (see Figure 1) dedicated to connecting computer 16 to computer network 18.

In this embodiment, adapter 30 will function as described for the first embodiment. However, the user will not be notified of an incoming computer network call while placing a public telephone network call, and vice-versa. Thus, the user will not be able to switch between these platforms in real time. Additionally, the user will not be alerted to an incoming computer network call unless computer 16 is connected to computer network 18.

While preferred embodiments of the present invention have been

illustrated in detail, it is apparent that modifications and adaptations of the preferred embodiments will occur to those skilled in the art. However, it will be expressly understood that such modifications and adaptations are within the spirit and scope of the present invention as set forth in the following claims.

CLAIMS

1. A telephone adapter comprising:

a) first receiving means for receiving analog telephony signals from a public telephone network;

b) second receiving means for receiving analog telephony signals from a telephone;

c) third receiving means for receiving control signals and electrical power from said computer;

d) first path means for transmitting analog telephony signals between said first receiving means and said second receiving means, said first path means being activatable and deactivatable;

e) second path means for (i) converting analog telephony signals received from said second receiving means to digitized signals and transmitting the digitized signals to a computer and (ii) converting digitized signals received from said computer to analog telephony signals and transmitting the analog telephony signals to said second receiving means, said second path means being activatable and deactivatable; and

f) controller means, responsive to the control signals, for deactivating said first path means and activating said second path means while said first path means is deactivated.

2. The adapter of Claim 1, further comprising:

g) means for transmitting a notification signal to said telephone when said first path means is activated and a computer network telephone call is received by said computer.

3. The adapter of Claim 1, further comprising:

h) means for transmitting a notification signal to said telephone when said second path means is activated and a public telephone network call is received at said first receiving means.

4. The adapter of Claim 1, further comprising:

i) means for (i) sensing an incoming public telephone network caller's telephone number and (ii) transmitting the telephone number to said computer.

5. The adapter of Claim 1, further comprising:

j) connector means for connecting said third receiving means to a universal serial bus of said computer.

6. The adapter of Claim 1, further comprising:

k) means for transmitting a signal to said telephone to cause said telephone to ring when a network telephone call is received by said computer and said telephone is hung up.

7. The adapter of Claim 1, further comprising:

l) means for detecting an analog telephony ring signal on said first path means.

8. The adapter of Claim 1, further comprising:

m) means for detecting an operational status of said telephone.

9. The adapter of Claim 1, further comprising:

n) means for placing the analog telephony signals received at said first receiving means in a hold status.

10. The adapter of Claim 1, further comprising:

o) DTMF detecting means for detecting digits dialed by said telephone.

11. The adapter of Claim 1, further comprising:

p) programmable memory means for storing program steps that control operation of said controller means.

12. The adapter of Claim 1, further comprising:

q) means for connecting said adapter to an external power source.

13. The adapter of Claim 1, wherein said first path means comprises switching means, responsive to said controller means, for (i) electrically connecting said second receiving means to said first path means in a first switch position and (ii) electrically connecting said second receiving means to said second path means in a second switch position.

14. The adapter of Claim 1, wherein said computer is a personal computer.

15. The adapter of Claim 1, wherein the digitized signals received from said computer are processed Internet telephony signals.

16. The adapter of Claim 1, wherein the digitized signals received from said computer are processed Intranet telephony signals.

17. A communication system comprising:

a telephone;

a computer connected to a computer network; and

an adapter device connected between said telephone and a public telephone network, and connected to said computer, wherein said adapter device comprises:

a) first connecting means for connecting said adapter device to said public telephone network;

b) second connecting means for connecting said adapter device to said telephone;

c) third connecting means for connecting said adapter device to said computer;

c) first path means for transmitting analog telephony signals between said first connecting means and said second connecting means, said first path means being activatable and deactivatable;

d) second path means for (i) converting analog telephony signals received from said telephone via said second connecting means to digitized signals and transmitting the digitized signals to said computer via said third connecting means and (ii) converting digitized signals received from said computer via said third connecting means to analog telephony signals and transmitting the analog telephony signals to said telephone via said second connecting means, said second path means also being activatable and deactivatable;

e) receiving means for receiving control signals and electrical power from said computer via said third connecting means; and

f) controller means, responsive to the control signals, for deactivating said first path means and activating said second path means while said first path means is inactive.

18. The system of Claim 17, wherein said computer comprises:

means for processing the digitized signals received from said adapter device and transmitting the processed digitized signals to said computer network; and

means for processing digital signals received from said computer network and transmitting the processed digital signals to said adapter device via said third connecting means.

19. The system of Claim 17, wherein said computer network is the Internet.

20. The system of Claim 17, wherein said computer network is an Intranet.

21. The system of Claim 17, wherein the digitized signals received from said computer are processed Internet telephony signals.

22. The system of Claim 17, wherein the digitized signals received from said computer are processed Intranet telephony signals.

23. A method of controlling telephonic voice communication comprising the following steps:

connecting an adapter device between a public telephone network and a telephone;

connecting said adapter device to a computer;

transmitting electrical power and control signals from said computer to said adapter for establishing at least a first and a second operating mode;

transmitting analog telephony signals between said telephone and said public telephone network via said adapter device, in the first operating mode;

converting analog telephony signals received from said public telephone network to digitized signals in said adapter device and transmitting the digitized signals to said computer; and

converting processed digital signals received from said computer to analog telephony signals in said adapter device and transmitting the analog telephony signals to said telephone, in the second operating mode.

24. The method of Claim 23, further comprising the following steps:

connecting said computer to a computer network.

25. The method of Claim 24, further comprising the following steps:

receiving digital telephony signals from said computer network and converting them into the processed digital signals; and,

transmitting the digitized signals received from said adapter device to said computer network.

26. An adapter device for interconnecting a telephone with a public telephone network and a computer network, comprising:

a first connector;

a second connector;

a third connector;

signal processing circuitry electrically connected to said third connector; and

a switch electrically connected by separate switch contacts to said first connector, said second connector, and said signal processing circuitry, wherein said switch electrically connects said first connector to said second connector in a first position, and electrically connects said second connector to said signal processing circuitry in a second position.

27. The adapter device of Claim 26, further comprising:

a programmable microcontroller electrically connected between said signal processing circuitry and said third

connector.

28. The adapter device of Claim 26, wherein said signal processing circuitry comprises analog-to-digital signal conversion circuitry and digital-to-analog signal conversion circuitry.

29. The adapter device of Claim 26, wherein said signal processing circuitry comprises a signal generator that generates a signal of sufficient amplitude and frequency to cause a telephone connected to said first connector to ring.

30. The adapter device of Claim 26, wherein said first connector and said second connector are RJ11 telephone jacks.

31. The adapter device of Claim 26, wherein said third connector is a Universal Serial Bus (USB) Series B receptacle.

32. The adapter of Claim 26, wherein said third connector is an integral USB cable.

33. An adapter device for interconnecting a telephone with a public telephone network and a computer network, and for converting processed computer network telephony signals into analog telephony signals, said adapter device comprising:

a first telephone jack;

a second telephone jack;

a universal serial bus connector;

signal processing circuitry, wherein said signal processing circuitry comprises analog-to-digital conversion circuitry and digital-to-analog conversion circuitry;

a controllable switch electrically connected by separate switch contacts to said first telephone jack, said second telephone jack, and said signal processing circuitry, wherein said switch electrically connects said first connector to said second connector in a first position, and electrically connects said second connector to said signal processing circuitry in a second position;

a programmable microcontroller electrically connected to said signal processing circuitry and said universal serial bus connector, wherein said programmable microcontroller controls operation of said signal processing circuitry and the position of said controllable switch; and

power conversion circuitry electrically connected to said universal serial bus connector, said signal processing circuitry, and said microcontroller, wherein said power conversion circuitry converts electrical power received at said universal serial bus connector to operating voltages for said signal processing circuitry and said microcontroller.

34. A telephone adapter comprising:

a) first receiving means for receiving analog telephone signals from a public telephone network;

b) second receiving means for receiving analog telephony signals from a telephone;

c) third receiving means for receiving control signals and electrical power from said computer;

d) first path means for transmitting analog telephony signals between said first receiving means and said second receiving means, said first path means being activatable and deactivatable;

e) second path means for (i) converting analog telephony signals received from said second receiving means to digitized signals and transmitting the digitized signals to a computer and (ii) converting digitized signals received from said computer to analog telephony signals and transmitting the analog telephony signals to said second receiving means, said second path means also being activatable and deactivatable;

f) controller means, responsive to the control signals, for deactivating said first path means and activating said second path means while said first path means is inactive;

g) means for transmitting a notification signal to said telephone when said first path means is activated and a computer network telephone call is received by said computer;

h) means for transmitting a notification signal to said telephone when said second path means is activated and a public telephone network call is received at said first

receiving means;

i) means for (i) sensing an incoming public telephone network caller's telephone number and (ii) transmitting the telephone number to said computer;

j) connector means for connecting said third receiving means to a universal serial bus of said computer;

k) means for transmitting a signal to said telephone to cause said telephone to ring when a network telephone call is received by said computer and said telephone is hung up;

l) means for detecting an analog telephony ring signal on said first path means;

m) means for detecting an operational status of said telephone;

n) means for placing the analog telephony signals received at said first receiving means in a hold status;

o) DTMF detecting means for detecting digits dialed by said telephone;

p) programmable memory means for storing program steps that control operation of said controller means; and

q) means for connecting said adapter to an external power source.

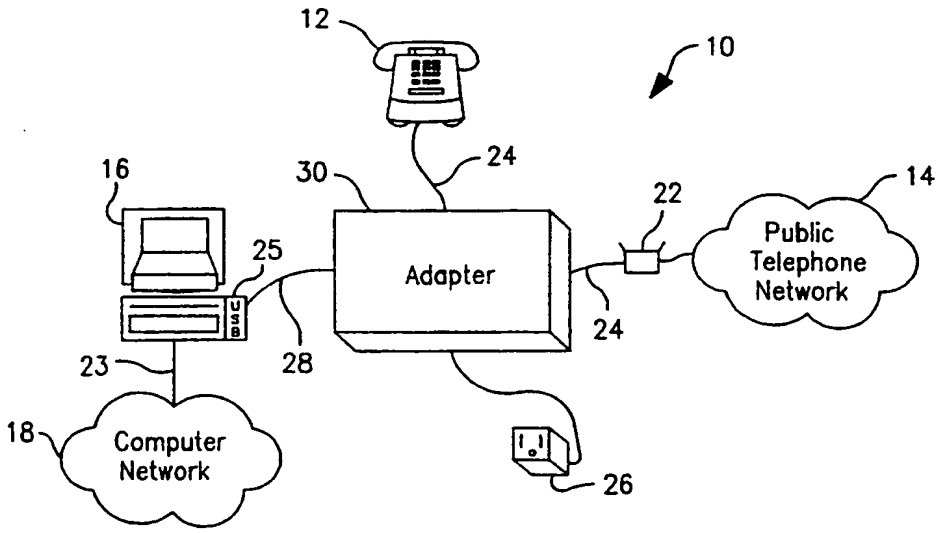
12
10
16
30
24
22
14
25
Adapter
Public
Telephone
Network
USB
24
23
28
18
Computer
Network
26

FIG. 1

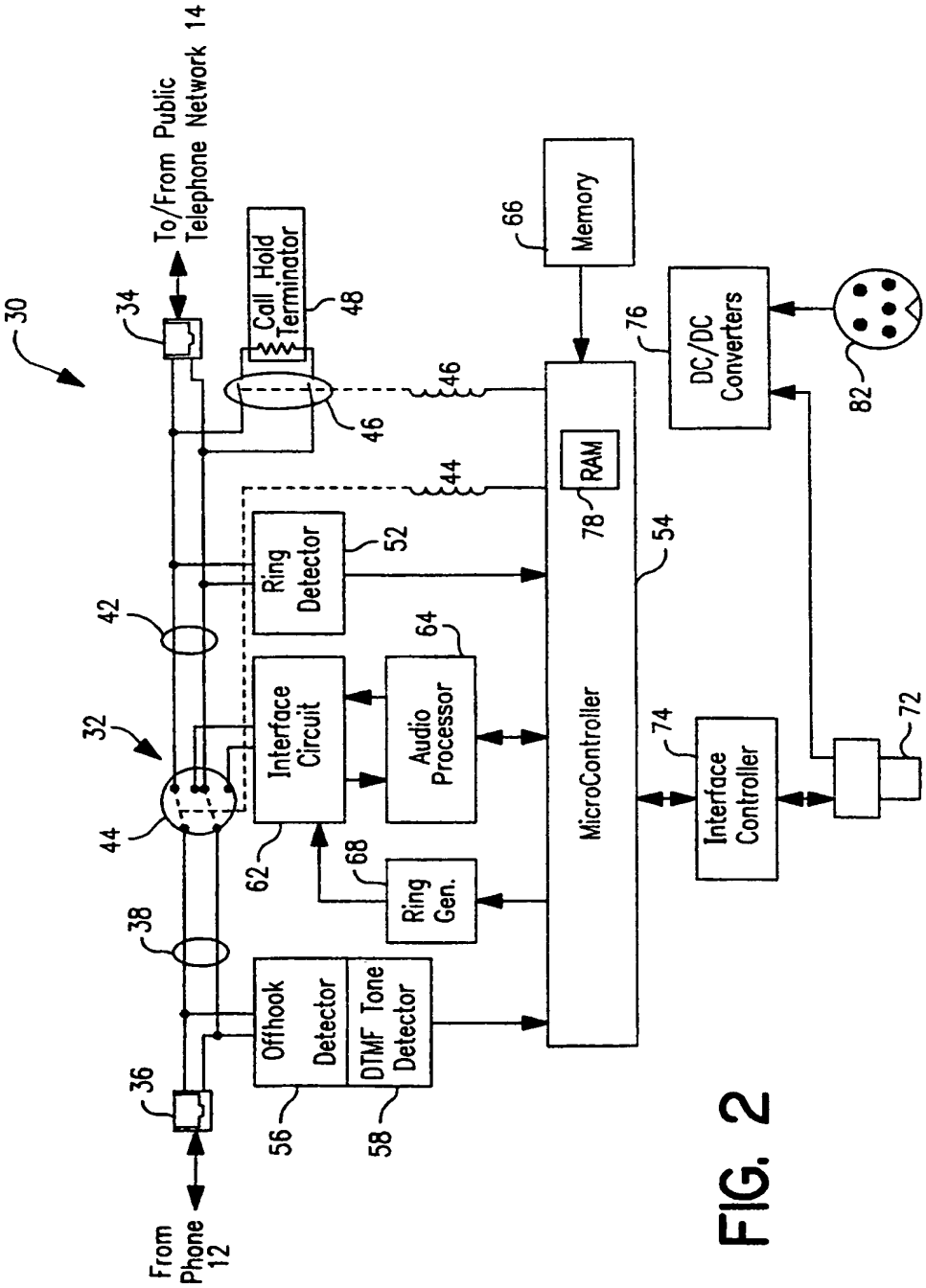

FIG. 2

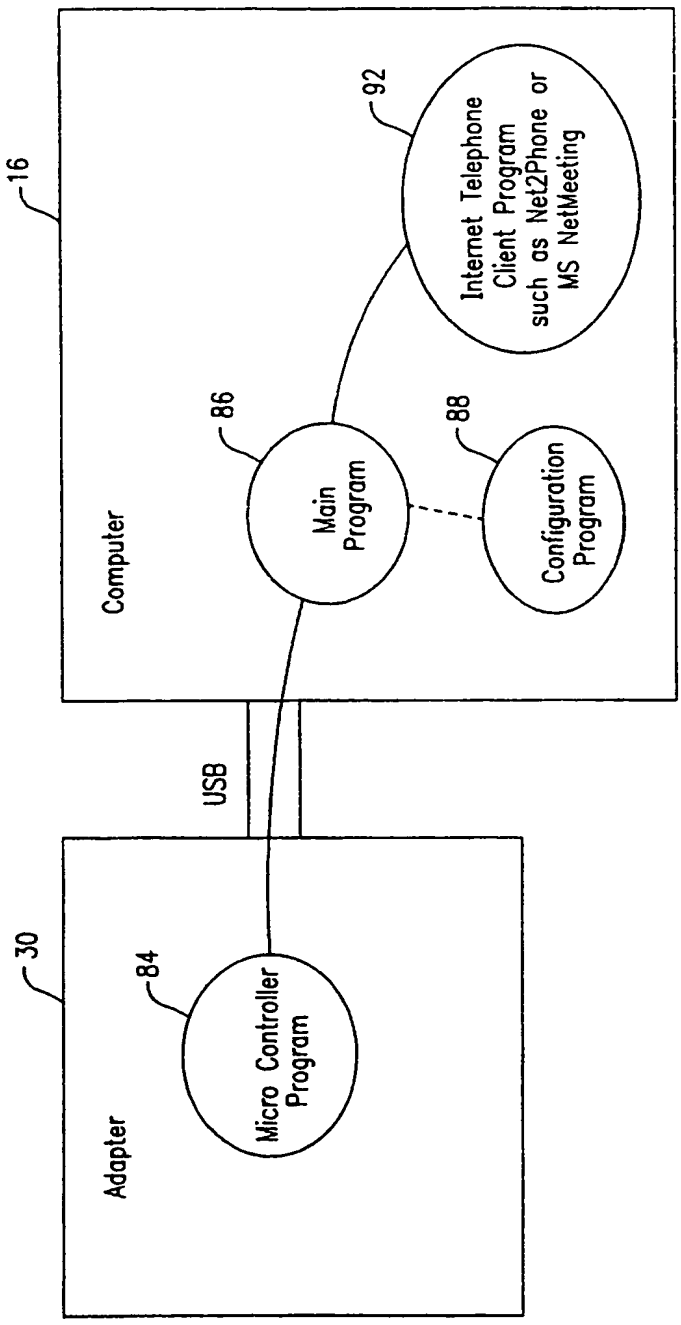
16
Computer
92
Internet Telephone Client Program such as Net2Phone or MS NetMeeting
86
Main Program
88
Configuration Program
USB
30
Adapter
84
Micro Controller Program

FIG. 3

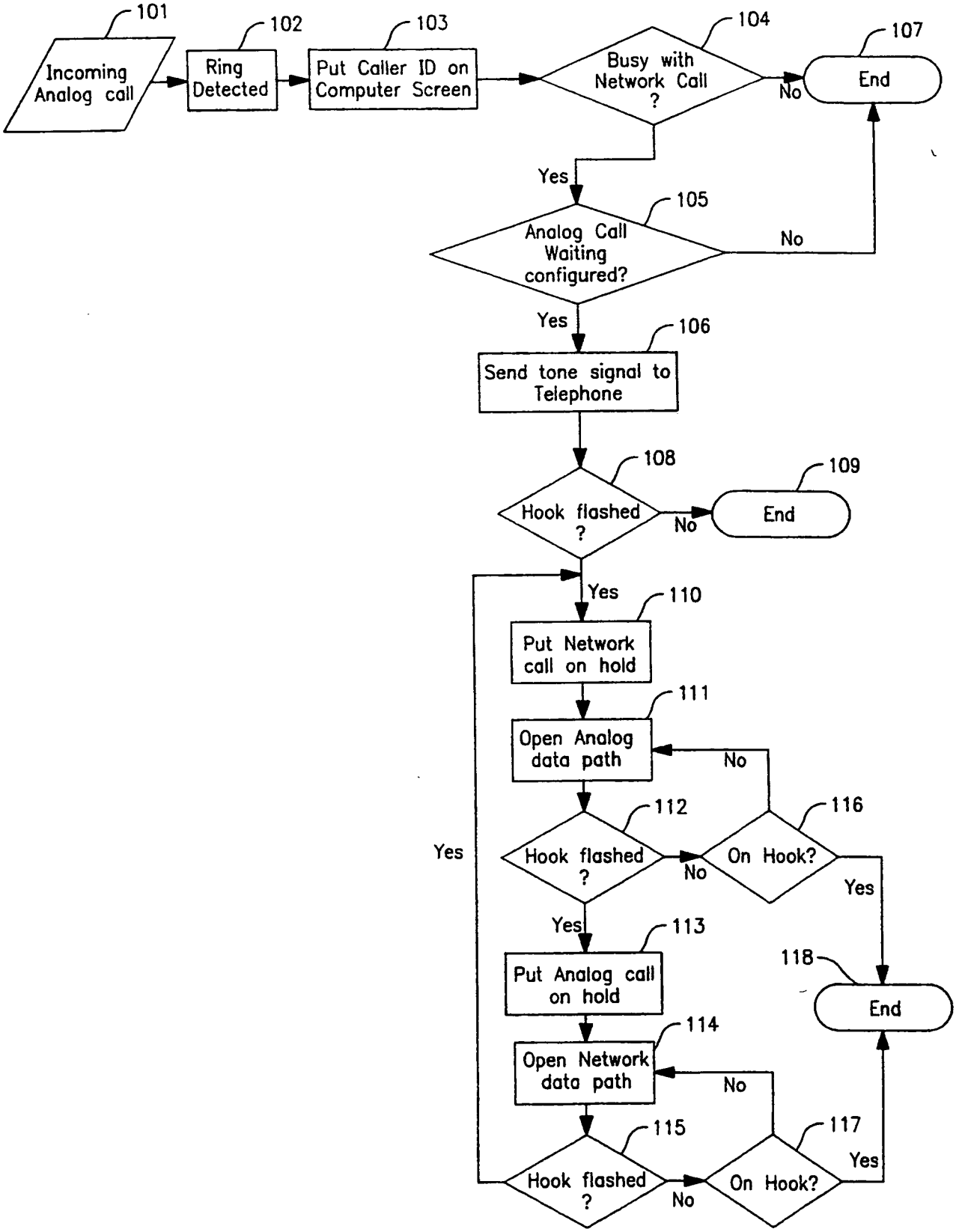
101
Incoming Analog call
102
Ring Detected
103
Put Caller ID on Computer Screen
104
Busy with Network Call ?
No
107
End
Yes
105
Analog Call Waiting configured?
No
Yes
106
Send tone signal to Telephone
108
Hook flashed ?
No
109
End
Yes
110
Put Network call on hold
111
Open Analog data path
No
112
Hook flashed ?
No
116
On Hook?
Yes
Yes
Yes
113
Put Analog call on hold
118
End
114
Open Network data path
No
115
Hook flashed ?
No
117
On Hook?
Yes

FIG. 4

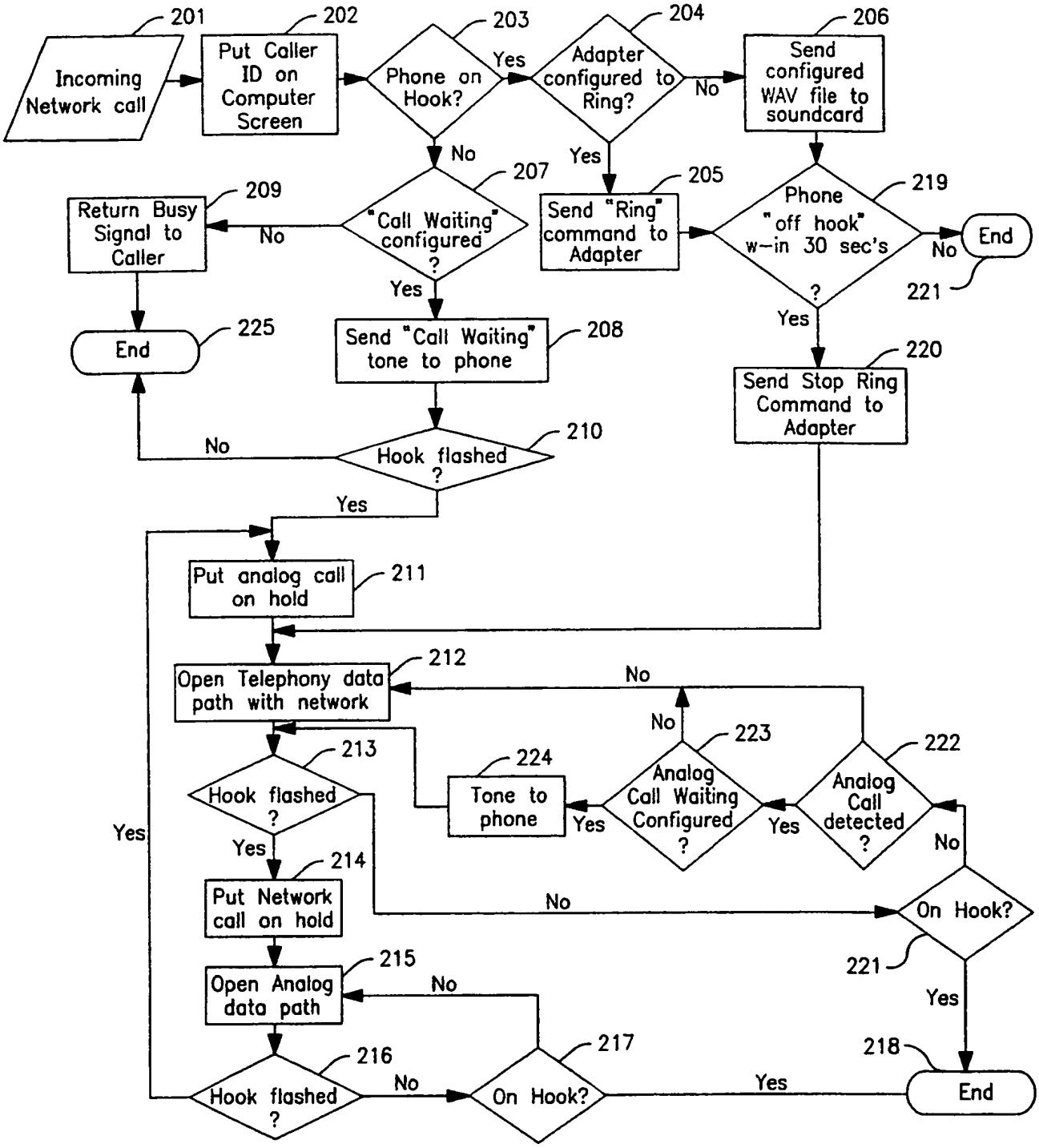
201
Incoming Network call
202
Put Caller ID on Computer Screen
203
Phone on Hook?
Yes
No
204
Adapter configured to Ring?
No
Yes
206
Send configured WAV file to soundcard
207
"Call Waiting" configured ?
No
Yes
209
Return Busy Signal to Caller
205
Send "Ring" command to Adapter
219
Phone "off hook" w-in 30 sec's ?
No
Yes
End
221
225
End
208
Send "Call Waiting" tone to phone
220
Send Stop Ring Command to Adapter
210
Hook flashed ?
No
Yes
211
Put analog call on hold
212
Open Telephony data path with network
213
Hook flashed ?
Yes
No
214
Put Network call on hold
215
Open Analog data path
216
Hook flashed ?
No
Yes
217
On Hook?
No
Yes
224
Tone to phone
223
Analog Call Waiting Configured ?
Yes
No
222
Analog Call detected ?
Yes
No
On Hook?
221
Yes
218
End

FIG. 5

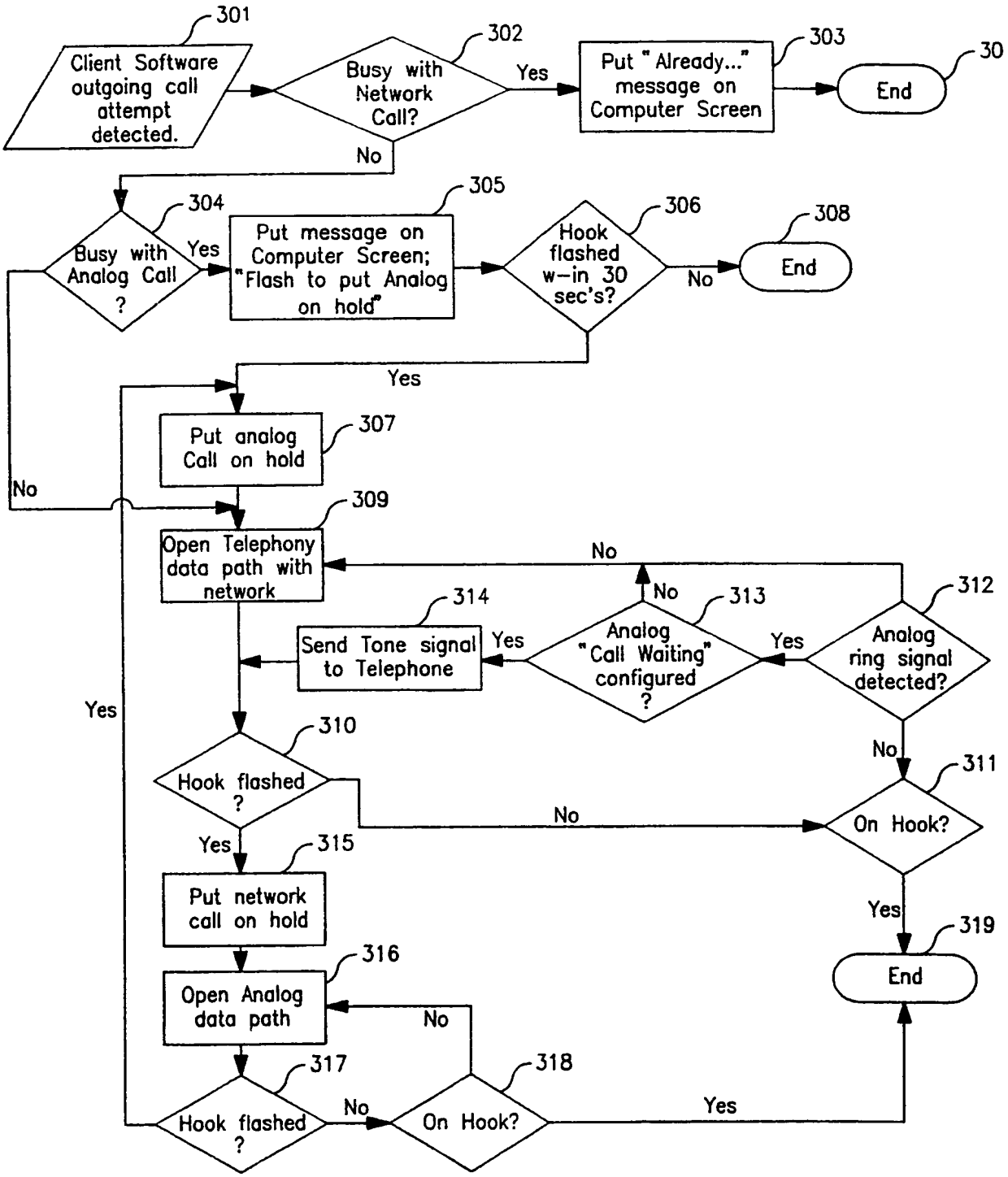

FIG. 6

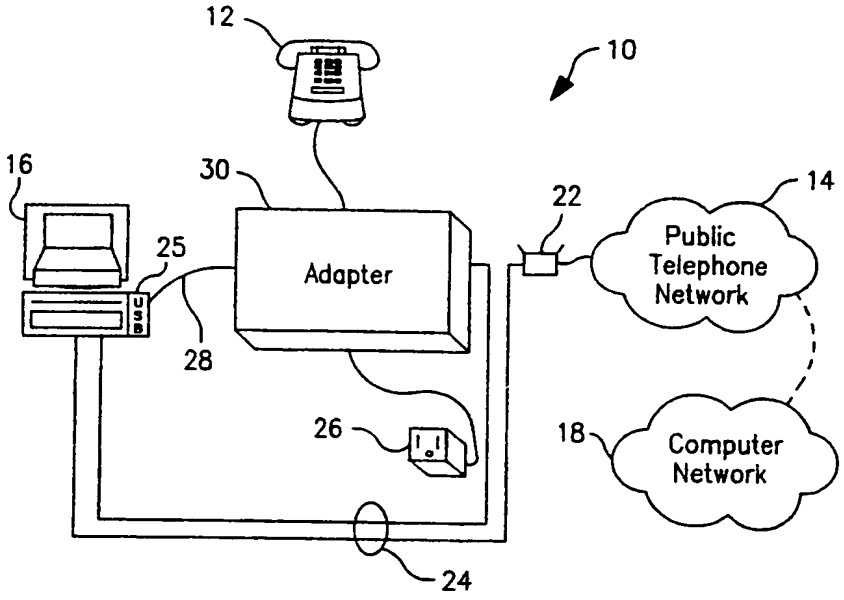
12
10
16
30
22
14
25
Adapter
Public
Telephone
Network
28
26
18
Computer
Network
24

FIG. 7

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/EP 00/03867

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/02 H04M1/253 H04M7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 98 37665 A (VAZIRI FARAMARZ ;WIMSATT JOHN D (US); FONEFRIEND SYSTEMS INC (US)) 27 August 1998 (1998-08-27) abstract; figure 4 page 4, line 1 -page 5, line 3 page 6, line 22 -page 7, line 14 page 10, line 13 -page 11, line 15; figure 1 page 12, line 4 - line 9 page 14, line 20 -page 16, line 6 page 21, line 2 - line 6 --- -/--	1,3-5,7, 8,10-28, 30-33 34

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 September 2000	20/09/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Willems, B

3

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INTERNATIONAL SEARCH REPORT

Inte[r]nal Application No
PCT/EP 00/03867

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 11704 A (DIALNET INC) 19 March 1998 (1998-03-19) abstract; figure 2A page 2, line 27 -page 3, line 5 page 6, line 30 -page 9, line 23 page 13, line 9 - line 20 page 19, line 23 - line 30	1,10-28, 30

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INTERNATIONAL SEARCH REPORT

information on patent family members

Inte onal Application No
PCT/EP 00/03867

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9837665 A	27-08-1998	AU 6666898 A	09-09-1998
		EP 0966815 A	29-12-1999
WO 9811704 A	19-03-1998	AU 4353097 A	02-04-1998

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(43) International Publication Date
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PCT

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(30) Priority Data:
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(74) Agent: VOSSIUS & PARTNER; P.O. Box 86 07 67, D-81634 München (DE).

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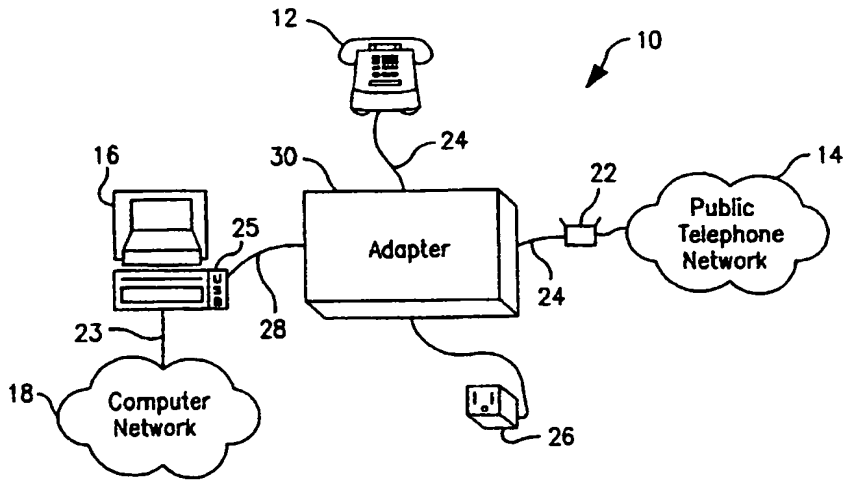
Published:
— *With international search report.*
— *With amended claims and statement.*

Date of publication of the amended claims and statement:
15 February 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: COMPUTER NETWORK TELEPHONY ADAPTER DEVICE



(57) Abstract: A telephony adapter device is connected to a public telephone network, a conventional telephone, and a computer, which allows the conventional telephone to be used for both traditional telephony and computer network telephony. The adapter includes a first connector for connecting adapter to the telephone, a second connector for connecting adapter to the public telephone network, and a third connector for connecting adapter to the computer. The adapter also includes signal processing circuitry electrically connected to the third connector, a switch electrically connected by separate switch contacts to the first and second connectors, and the signal processing circuitry, and a microcontroller connected between the signal processing circuitry and the third connector. The switch electrically connects the first connector to the second connector in a first position, and electrically connects the first connector to the signal processing circuitry in a second position. Operation of the adapter, including the positioning of the switch, is controlled by the microcontroller.

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AMENDED CLAIMS
[received by the International Bureau on 20 November 2000 (20.11.00);
original claims 1, 15-17, 21-24 and 34 amended; remaining claims unchanged (8 pages)]

1. A telephone adapter comprising:

a) first receiving means for receiving analog telephony signals from a public telephone network;

b) second receiving means for receiving analog telephony signals from a telephone;

c) third receiving means for receiving control signals and electrical power from a computer;

d) first path means for transmitting analog telephony signals between said first receiving means and said second receiving means, said first path means being activatable and deactivatable;

e) second path means for (i) converting analog telephony signals received from said second receiving means to digitized signals and transmitting the digitized signals to said computer and (ii) converting digital signals received from said computer to analog telephony signals and transmitting the converted analog telephony signals to said second receiving means, said second path means being activatable and deactivatable; and

f) controller means, responsive to the control signals, for deactivating said first path means and activating said second path means while said first path means is deactivated.

2. The adapter of Claim 1, further comprising:

g) means for transmitting a notification signal to said telephone when said first path means is activated and a computer network telephone call is received by said computer.

3. The adapter of Claim 1, further comprising:

h) means for transmitting a notification signal to said telephone when said second path means is activated and a public telephone network call is received at said first receiving means.

4. The adapter of Claim 1, further comprising:

i) means for (i) sensing an incoming public telephone network caller's telephone number and (ii) transmitting the telephone number to said computer.

5. The adapter of Claim 1, further comprising:

j) connector means for connecting said third receiving means to a universal serial bus of said computer.

6. The adapter of Claim 1, further comprising:

k) means for transmitting a signal to said telephone to cause said telephone to ring when a network telephone call is received by said computer and said telephone is hung up.

7. The adapter of Claim 1, further comprising:

l) means for detecting an analog telephony ring signal on said first path means.

8. The adapter of Claim 1, further comprising:

m) means for detecting an operational status of said telephone.

9. The adapter of Claim 1, further comprising:

n) means for placing the analog telephony signals received at said first receiving means in a hold status.

10. The adapter of Claim 1, further comprising:

o) DTMF detecting means for detecting digits dialed by said telephone.

11. The adapter of Claim 1, further comprising:

p) programmable memory means for storing program steps that control operation of said controller means.

12. The adapter of Claim 1, further comprising:

q) means for connecting said adapter to an external power source.

13. The adapter of Claim 1, wherein said first path means comprises switching means, responsive to said controller means, for (i) electrically connecting said second receiving means to said first path means in a first switch position and (ii) electrically connecting said second receiving means to said second path means in a second switch position.

14. The adapter of Claim 1, wherein said computer is a personal computer.

15. The adapter of Claim 1, wherein the digital signals received from said computer are processed Internet telephony signals.

16. The adapter of Claim 1, wherein the digital signals received from said computer are processed Intranet telephony signals.

17. A communication system comprising:

a telephone;

a computer connected to a computer network; and

an adapter device connected between said telephone and a public telephone network, and connected to said computer, wherein said adapter device comprises:

a) first connecting means for connecting said adapter device to said public telephone network;

b) second connecting means for connecting said adapter device to said telephone:

c) third connecting means for connecting said adapter device to said computer;

d) first path means for transmitting analog telephony signals between said first connecting means and said second connecting means, said first path means being activatable and deactivatable;

e) second path means for (i) converting analog telephony signals received from said telephone via said second connecting means to digitized signals and transmitting the digitized signals to said computer via said third connecting means and (ii) converting digital signals received from said computer via said third connecting means to analog telephony signals and transmitting the converted analog telephony signals to said telephone via said second connecting means. said second path means also being activatable and deactivatable;

f) receiving means for receiving control signals and electrical power from said computer via said third connecting means; and

g) controller means, responsive to the control signals, for deactivating said first path means and activating said second path means while said first path means is deactivated.

18. The system of Claim 17, wherein said computer comprises:

means for processing the digitized signals received from said adapter device and transmitting the processed digitized signals to said computer network; and

means for processing digital signals received from said computer network and transmitting the processed digital signals to said adapter device via said third connecting means.

19. The system of Claim 17, wherein said computer network is the Internet.

20. The system of Claim 17, wherein said computer network is an Intranet.

21. The system of Claim 17, wherein the digital signals received from said computer are processed Internet telephony signals.

22. The system of Claim 17, wherein the digital signals received from said computer are processed Intranet telephony signals.

23. A method of controlling telephonic voice communication comprising the following steps:

connecting an adapter device between a public telephone network and a telephone;

connecting said adapter device to a computer;

transmitting electrical power and control signals from said computer to said adapter for establishing at least a first and a second operating mode;

transmitting analog telephony signals between said telephone and said public telephone network via said adapter device, in the first operating mode;

converting analog telephony signals received from said public telephone network to digitized signals in said adapter device and transmitting the digitized signals to said computer; and

converting processed digital signals received from said computer to analog telephony signals in said adapter device and transmitting the converted analog telephony signals to said telephone, in the second operating mode.

24. The method of Claim 23, further comprising the following step:

connecting said computer to a computer network.

25. The method of Claim 24, further comprising the following steps:

receiving digital telephony signals from said computer network and converting them into the processed digital signals; and,

transmitting the digitized signals received from said adapter device to said computer network.

26. An adapter device for interconnecting a telephone with a public telephone network and a computer network, comprising:

a first connector;

a second connector;

a third connector;

signal processing circuitry electrically connected to said third connector; and

a switch electrically connected by separate switch contacts to said first connector, said second connector, and said signal processing circuitry, wherein said switch electrically connects said first connector to said second connector in a first position, and electrically connects said second connector to said signal processing circuitry in a second position.

27. The adapter device of Claim 26, further comprising:

a programmable microcontroller electrically connected between said signal processing circuitry and said third connector.

28. The adapter device of Claim 26, wherein said signal processing circuitry comprises analog-to-digital signal conversion circuitry and digital-to-analog signal conversion circuitry.

29. The adapter device of Claim 26, wherein said signal processing circuitry comprises a signal generator that generates a signal of sufficient amplitude and frequency to cause a telephone connected to said first connector to ring.

30. The adapter device of Claim 26, wherein said first connector and said second connector are RJ11 telephone jacks.

31. The adapter device of Claim 26, wherein said third connector is a Universal Serial Bus (USB) Series B receptacle.

32. The adapter of Claim 26, wherein said third connector is an integral USB cable.

33. An adapter device for interconnecting a telephone with a public telephone network and a computer network. and for converting processed computer network telephony signals into analog telephony signals, said adapter device comprising:

a first telephone jack;

a second telephone jack;

a universal serial bus connector;

signal processing circuitry, wherein said signal processing circuitry comprises analog-to-digital conversion circuitry and digital-to-analog conversion circuitry;

a controllable switch electrically connected by separate switch contacts to said first telephone jack, said second telephone jack, and said signal processing circuitry, wherein said switch electrically connects said first connector to said second connector in a first position, and electrically connects said second connector to said signal processing circuitry in a second position;

a programmable microcontroller electrically connected to said signal processing circuitry and said universal serial bus connector, wherein said programmable microcontroller controls operation of said signal processing circuitry and the position of said controllable switch; and

power conversion circuitry electrically connected to said universal serial bus connector, said signal processing circuitry, and said microcontroller, wherein said power conversion circuitry converts electrical power received at said universal serial bus connector to operating voltages for said signal processing circuitry and said microcontroller.

34. A telephone adapter comprising:

a) first receiving means for receiving analog telephone signals from a public telephone network;

b) second receiving means for receiving analog telephony signals from a telephone;

c) third receiving means for receiving control signals and electrical power from a computer;

d) first path means for transmitting analog telephony signals between said first receiving means and said second receiving means. said first path means being activatable and deactivatable:

e) second path means for (i) converting analog telephony signals received from said second receiving means to digitized signals and transmitting the digitized signals to said computer and (ii) converting digital signals received from said computer to analog telephony signals and transmitting the converted analog telephony signals to said second receiving means, said second path means also being activatable and deactivatable;

f) controller means, responsive to the control signals, for deactivating said first path means and activating said second path means while said first path means is deactivated;

g) means for transmitting a notification signal to said telephone when said first path means is activated and a computer network telephone call is received by said computer;

h) means for transmitting a notification signal to said telephone when said second path means is activated and a public telephone network call is received at said first receiving means;

i) means for (i) sensing an incoming public telephone network caller's telephone number and (ii) transmitting the telephone number to said computer;

j) connector means for connecting said third receiving means to a universal serial bus of said computer;

k) means for transmitting a signal to said telephone to cause said telephone to ring when a network telephone call is received by said computer and said telephone is hung up;

l) means for detecting an analog telephony ring signal on said first path means;

m) means for detecting an operational status of said telephone;

n) means for placing the analog telephony signals received at said first receiving means in a hold status;

o) DTMF detecting means for detecting digits dialed by said telephone;

p) programmable memory means for storing program steps that control operation of said controller means; and

q) means for connecting said adapter to an external power source.

STATEMENT UNDER ARTICLE 19(1)

Claims 1, 15-17, 21-24, and 34 have been amended in the above-identified PCT application in order to improve the form of the claims. The changes embodied in these amendments are minor wording changes and do not alter the substantive meanings of the original claims. As such, all claims as amended are fully supported by the description and drawings as originally filed. No new matter has been added.